IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Ronald D. BLUM, ET AL. Application No.: 09/994,860 Filed: November 28, 2001 For: METHOD AND APPARATUS FOR REDUCING THE INTENSITY OF HURRICANES AT SEA BY DEEP-WATER UPWELLING Customer No.: 20350	Confirmation No. 9812 Examiner: Boeckmann, Jason Technology Center/Art Unit: 3752

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER 37 C.F.R. § 1.132

I, Captain Neil E. Rondorf (United States Navy, Retired) declare the following:

1. I am Assistant Vice President of Science Applications International Corporation headquartered in LaJolla, California with east coast headquarters in McLean, Virginia.

2. I hold a Bachelor of Science degree in Oceanography from the U.S. Naval Academy, a Master's Equivalent in Nuclear Engineering from the Naval Nuclear Power Program, and a Master's Equivalent in International Relations from the Naval War College. I have over 25 years of management and technical engineering of Navy programs including shipboard operations and Integrated Undersea Surveillance System programs. A copy of my resume is attached as Exhibit A.

3. I have been retained by the assignee of the above-identified application to assist in responding to the Office Action. I have no financial interest in the assignee or the outcome of this patent application, including whether it issues as a patent or not. I am being compensated for the time spent on this matter at the rate of $200/hr, plus reasonable expenses.

4. I have read and am familiar with the above-referenced application. I have also read and am familiar with the Office Action mailed May 4, 2007 ("Office Action") pertaining to this application.

5. It is my understanding that the claims currently under examination, which relate to, *inter alia*, methodologies for reducing the intensity of a hurricane, were rejected as allegedly being wholly inoperative, lacking credible utility, and not enabled. Specifically, the Examiner asserts:

> …applicant admits in his arguments, "submersibles of the kind required for this application do not presently exist." It seems that applicant wishes that someone will come along and develop the technology required to make the required submersibles, thereby enabling the present invention. Therefore, it is impossible for one of ordinary skill in the art at his time to make and or use this invention. Office Action at page 6.

6. This Declaration provides support that the type and number of submersibles needed for implementing the claimed invention may be readily ascertained by using the amount of direction provided for in the specification and the knowledge of one skilled in the art at the time of filing the application without any undue or unreasonable experimentation. In particular, the specification is replete with the detailed description of various gas sources (*see, e.g.*, para 0029), submersible designs (*see, e.g.*, para 0034), inception strategies (*see, e.g.*, 0026-27, 49-64), and the exemplary calculation for upwelling volume required for successful surface water cooling (*see, e.g.*, 0049-64).

7. During my experience of new construction on USS Indianapolis (SSN-697), I became very familiar with submarine construction. In addition, during my tour as Commanding Officer

of USS Minneapolis-St Paul (SSN 708), I conducted a 12 month conversion period in Portsmouth Naval Shipyard. During this time, I became intimately familiar with shipyard conversion methodologies. Based on this experience and construction methods available on or before November 28, 2001, the modification of exiting submarine hulls or construction of a towed body to carry and release a desired amount of gas to produce an upwelling was well within both design and industrial capacity and could have been implemented in a straight forward manner.

8. Submarines may be converted to a gas carrying capacity by two methods. The first conversion method is the modification of existing submarine hulls. The most favorable submarine choices for conversion to a gas carrying capacity would be the Russian Typhoon Submarine and the US Trident Missile Submarine. Indeed, the conversion of submarine missile load capacity to other uses is a proven technology that has been executed by the United States industrial capacity. For example, using technology available on or before November 28, 2001, the Navy began a submarine conversion in November 2003 and completed converting the first submersible ship ballistic missile (SSBN) hull to a submersible ship guided missile (SSGN) hull and was completed December 2005. Here, the missile tubes were converted for use as conventional missile launcher. In addition, inserts were developed to fit inside the former missile tube yielding an alternative mission payload capacity. The converted tubes for alternative payloads are designed to equalize with the pressure of the sea and allow the deployment of the payload with the upper hatch open and no pressure differential. Thus, the bubble method for gas release would be very compatible with this operating concept. This conversion is a matter of record in Department of Defense program documents. The conversion is described in detail in the reference from the Commander Submarine Force web site attached as Exhibit B.

9. The second submarine conversion method involves cutting the submarine hull in half and inserting a new section specific for the desired use. The United States and Russia have successfully converted submarine hulls from one use to another using this approach on or before November 28, 2001 and could have been implemented in a straightforward manner. Therefore,

the conversion of an entire section of a submarine from its original use to a gas release volume is entirely within the capacity of shipyards within the United States and other developed industrial nations. The normal bulkhead construction allows for watertight integrity in each compartment in order to allow the compartment to be isolated in the event of flooding. Thus this design technique can be used to provide pressure isolation to the proposed gas volume hull section. Using this approach, the Typhoon hull form would be the preferred choice for conversion to a gas carrying capacity.

10. As an alternative to submarine conversion, a towed body may be readily constructed to carry and release the gas required for upwelling. The towed body would be a simplified submersible that could be entirely constructed using submarine construction methodologies available on or before November 28, 2001. If the towed body is unmanned, the majority of the body's volume may be dedicated to gas carrying capacity with minimum on board systems such as depth control, minimum propulsion, and gas storage and release systems. The existing Naval Research vessel NR-1 is an example of a towed body application and has an estimated volume as a towed body of approximately 32,400 ft^3. The existing submersible can be easily scaled up to increase gas carrying capacity.

11. The towing of submerged bodies or the towing of surfaced bodies capable of submersion is a tested technology. For example, the United States Navy constructed NR-1, a small manned submersible; several decades ago, however, it was originally designed to be towed to the operations site as a submersible. This methodology was developed and deployed on USS Batfish. The towing was later converted to use by the Navy, which utilized surface ships to tow the NR-1. The NR-1 has operated for several decades as a submersible towed body. Once released and submerged it operates independently as a manned submersible. The NR-1 is designed as a manned submersible with a crew to operate the small nuclear reactor the submarine systems. Due to it's limited speed it is towed to it's operations site and then released to conduct manned missions. Using NR-1 to approximate a towed body size that has actually been operated as a towed body provides credibility for the towed body concept. The remote operation of submerged bodies in now perfected in the Navy's Unmanned Undersea Vehicles program

(UUV). These technologies are applicable to several mission areas such as remote mine hunting, remote survey and environmental data collection.

12. The number of submersibles needed for carrying out the claimed invention may be readily ascertained by one skilled in the art by determining the gas volume storage capability of each submersible and by using the equations disclosed in the specification for calculating the upwelling volume of gas and the examples of the amount of gas required to produce such as upwelling.

13. For example, a Typhoon hull is approximately 172 meters long with a beam of 23.3 meters which equates to a volume of approximately 73,000 cubic meters. The Trident hull is about 171 meters in length with a 12.8 meter beam and which equates to a volume of approximately 22,000 cubic meters. The near term volume would be to convert the missile tube volume to a gas carrying capacity. The conversion of the tube sizes is described in the table below (numbered references are attached as Exhibit C).

	U.S. Trident Submarine	**Russian Typhoon Class**
Speed	20+ knots[1]	25+ knots[2]
Depth	300+ m[1]	400+ m[3]
Armament	24 tubes for *Trident* I and II	20 tubes for RSM-52 ballistic missile
Volume	Trident 1 is 34' in length and 74 inches in diameter.[4] The volume per tube is estimated at 1002 ft^3, thus the total volume is 24,048 ft^3.	The RSM-52 is 52.5' in length and 7.83' in diameter.[5] The volume per tube is estimated at 804 ft^3, thus the total volume is 16,000 ft^3.

14. Accordingly, the number of submersibles needed, such as the Typhoon hull having a gas volume capacity of 73,000 m^3, to carrying out the invention would be simply determined by dividing the quantity of liquid gas required for upwelling as described in the application divided by the gas carrying capacity of the submersible. For example, for a volume of 687 million Nm^3 of CO_2, it is estimated that 476 normal cubic meters of gas would be liberated per cubic meter of liquid. Thus, 1.4 million m^3 liquid CO_2 would be required. Accordingly, in the 500-600 m depths where the submersible payloads would be charged with CO_2, only 19 Typhoon hulls would be required.

15. All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that the statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and such willful false statements may jeopardize the validity of the application or any patents issuing thereon.

Date 10-24-07

Captain Neil E. Rondorf, USN (Retired)

Exhibit A

Captain Neil E. Rondorf, USN

Commander, Undersea Surveillance

Captain Rondorf was born in Thief River Falls, Minnesota, and graduated from Lincoln High School in 1970. He graduated from the United States Naval Academy with honors in 1974. Following graduation he completed Nuclear Power Training and Submarine School.

From 1975 until 1979, Captain Rondorf served as division officer on board USS ANDREW JACKSON (SSBN 619), participating in six strategic deterrent patrols. He was subsequently assigned as the commissioning crew Weapons Officer on USS INDIANAPOLIS (SSN 697). Upon completion of shakedown and certification, he was ordered to USS ROBERT E. LEE (SSBN 601) as Engineer Officer and completed the last Polaris missile patrol in the Pacific Theater. While serving as Navigator on board USS OMAHA (SSN 692) from 1981 to 1984, the ship completed two deployments to the Western Pacific and the initial 688 class submarine shock trials.

After serving as the Director, Enlisted Academics at the Naval Nuclear Power School from 1984 to 1986, Captain Rondorf was assigned as Executive Officer USS JACKSONVILLE (SSN 699). From 1987 to 1989 the ship completed two deployments, the first full-scale submarine shock trials in twenty years and commenced overhaul. In April 1990 he took command of USS MINNEAPOLIS-ST PAUL (SSN 708) and deployed to the Mediterranean Sea as the first submarine carrying Tomahawk missiles for use in Operation Desert Shield/Storm. The ship was awarded the Meritorious Unit Commendation for its contributions to the conflict.

From November 1992 to July 1994 Captain Rondorf was assigned as Deputy Commander, Submarine Squadron Three in San Diego. From April to July 1993 he commanded USS GURNARD (SSN 662), which was deployed to the Western Pacific. During his tour, Submarine Squadron Three was awarded the Meritorious Unit Commendation for developing submarine joint warfare concepts. From July 1994 to July 1996, he served in the Defense Liaison Division, Office of the Chief of Naval Operations, Washington, DC. In July 1996 Captain Rondorf became the Head, Undersea Surveillance (N874), Submarine Warfare Division on the staff of the Chief of Naval Operations.

Captain Rondorf assumed command of Commander, Undersea Surveillance on 12 August 1999 and retired from active duty on 01 October 2001.

Captain Rondorf is married to the former Cheryl Anne Kruse of Sparta, New Jersey. They presently reside in Virginia Beach, with their three children Ryan, Kira and Kevin. Their son Sean is a Combat Engineer with the 82nd Airborne at Ft Bragg.

Neil E. Rondorf, Science Applications International Corporation, Resume (3/06/06)
Assistant Vice President, Maritime

Education: Bachelor of Science, Oceanography, U.S. Naval Academy. 1974
Master's Equivalent, Nuclear Engineering, Naval Nuclear Power Program, 1976
Master's Equivalent, International Relations, Naval War College, Newport, RI, 1997

Security Clearance: Top Secret

Project lead, Maritime Renewable Technologies development, NAMS Business Unit.

Work Summary: Assistant Vice President, Maritime Operation for 18 months. Five years of technical consulting in maritime industry on commercial and government projects as a member of the SAIC Team. Over 25 years of management and technical engineering of Navy programs including shipboard operations and Integrated Undersea Surveillance System (IUSS) programs. Three years of management in IUSS programs including budgeting, and developing implementation of advanced technology insertions and innovating new concepts utilizing legacy technologies. Two years of operational management including definition of C4ISR/IT needs for the future, sensor design and data processing requirements for IUSS systems including SURTASS/ ADS and Fixed Surveillance programs.

Professional Experience:
Sep 05 – Present: Division Manager, Maritime Engineering
Aug 04 – Sep 05: Maritime Operations Manager, Naval and Maritime Solutions Group.
Nov 2001-Aug 04: Director, Maritime Technologies, SAIC/Technology Research Group: Providing program management assistance to IUSS programs. Program development for Maritime Harbor Security. Concept development for testing emerging technologies at sea. Leading role in building public private partnerships with Virginia Universities to enhance research capability in the state of Virginia
Aug 1999 – Oct 2001: Captain, USN, Commander Undersea Surveillance: Managed budgets and schedules of 8 ships at sea and 3 shore facilities conducting acoustic monitoring and ocean surveillance. Directed effort to define operational requirements for ADS acquisition and develop new processing implementation on both ships and shore facilities. Conducted review of C4ISR/IT program for IUSS requirements and the future programs.
July 1996-July 1999: Captain, USN, Head Integrated Undersea Surveillance Branch-Submarine Directorate, OPNAV Staff: Supervised financial planning and budget for IUSS programs. Reviewed Analysis of Alternatives for ADS to determine the best technical opportunity for ADS acquisition. Worked with SPAWAR PMW's to develop insertion plan for advanced technologies in sensor processing and C4ISR/IT programs.

Miscellaneous:

Appointed to Public – Private Partnership, Virginia Institute of Marine Science at the College of William and Mary, Gloucester, VA

Founding Industry partner, Virginia Coastal Energy Research Consortium
Executive Committee, International Cable Protection Committee
Director, Ocean Renewable Energy Coalition (OREC)
Member: Naval Submarine League
Member, Marine Technology Society

Customers: PMW-181 SPAWAR / College of William and Mary
PEO-IWS Navsea

References:
Mr Tom Baybrook, General Manager, NAMS BU, Ph # 7030676-4421
Dr. Peter Mikhalevsky, Manager, Ocean Sciences Operation, 703-676-4784
RADM Jack Dantone, (USN, RET) 757-672-5109
Dr. John Wells, Director, Virginia Institute of Marine Science, 804-684-7103

Exhibit B

SSGN www.sublant.navy.mil/HTML/ssgn.htm

A Transformational Force for the U.S. Navy

Home / Subs & Squadrons / SSGN Conversion

Conversion Update

USS Ohio's return to the Fleet was formally recognized at a ceremony in Bangor, Washington on February 7, 2006

Ohio 726	Florida 728	Michigan 727	Georgia 729
• ERO Started: Nov 2002 • Conversion Started: Nov 2003 • Returned to Fleet: Dec 2005	• ERO Started: Aug 2003 • Conversion Started: Apr 2004 • Returns to Fleet: Apr 2006	• ERO Started: Mar 2004 • Conversion Started: Jan 2005 • Returns to Fleet: Dec 2006	• ERO Started: Mar 2005 • Conversion Started: Oct 2005 • Returns to Fleet: Sep 2007

Even beyond its baseline mission capabilities, SSGN offers significant opportunities to develop and test new weapon delivery systems, sensors, and operational concepts that could further transform naval warfare.

SSGN

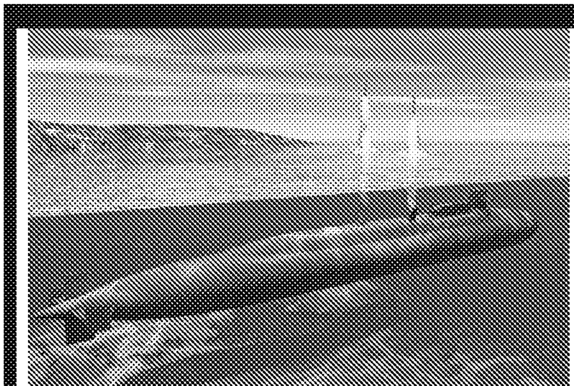
Guided Missile Submarines

Transformation and the Navy

Well before the events of September 11th, the vision of how the military must change to face future threats effectively, and the value of submarines as part of that fight, were clear.

During the Cold War we created the first SSBN by enlarging the partially-constructed hull of the then-named *Scorpion*. In only two years the conversion was complete, the ship was renamed USS *George Washington* (SSBN-598), and the concept of strategic deterrence was changed forever. Clearly, there is a well-established precedent of converting existing platforms into new ones built on proven concepts and the latest technology.

Today's "transformation" efforts include advanced sensors and surveillance systems, rapid precision strike, assured access to hostile or denied areas, and a high "tooth-to-tail ratio" (the ratio of combat power to required support).



SSGN GRAPHIC RESOURCES:

- USS Ohio photos
- SSGN Conversion Update
- TIF image of Ohio Class with ASDS
- Concept drawing of SSGN
- SSGN Cutaway graphic
- Navy Fact File page on SSGNs

- **Forward Presence** - Utilizing the two-crew concept, the four SSGNs will provide a continuous 2.4 submarines in-theater presence.

- **Strike Capability** - Each of the converted submarines will have the capability to launch up to 154 Tomahawk land attack missiles. The SSGNs have 22 missile tubes, which can house seven missiles per tube in Multiple All-Up-Round Canisters (MACs).

- **Special Operations Capability** – SSGNs will have separate, interchangeable canisters for Special Operations Forces (SOF) equipment that can be installed in place of the MACs. Clandestine insertion and retrieval of SOF operators (via lockout chambers) will be enhanced by the ability of the SSGN to host dual dry deck shelters with SEAL Delivery Vehicles (SDVs) and/or Advanced SEAL Delivery System (ASDS).

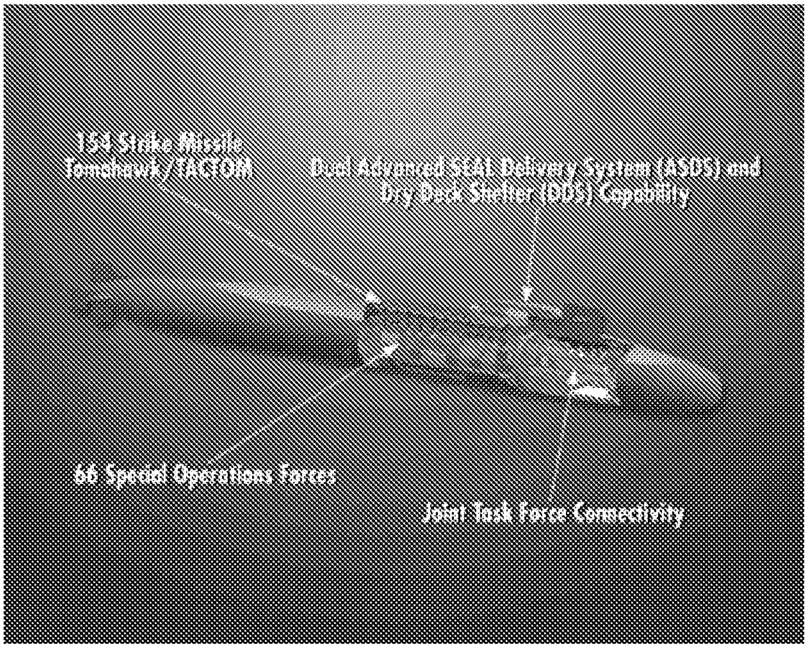
- **Connectivity** - SSGNs will be configured for high data rate connectivity using sail-mounted Universal Modular Masts and the Common Submarine Radio Room (CSRR). The Battle Management Center will also provide the SSGN with the capability to host an embarked joint command element.

Responsive, forward-deployed units, survivable against anti-access threats, and capable of sustained high-volume strike with minimal logistic support, score high in these categories - SSGN is a prime example.

Overview of SSGN Capabilities

Here is a quick summary of the capabilities SSGN brings to Joint Warfare:

- TRIDENT stealth and reliability, with more than 20 years of service life remaining for each



SSGN

- Large-volume precision strike, with up to 154 Tomahawk and Tactical Tomahawk cruise missiles

- Sustained Special Forces operations to include insertion, extraction, and support of 102 Special Forces personnel, conditioned and ready, with onboard periods much longer than on SSNs

- Command center for mission planning and execution

- Capacity for conducting other SSN missions, such as: intelligence, surveillance, reconnaissance, and targeting; anti-submarine warfare; anti-surface warfare; and mine warfare

- High-data-rate connectivity and joint command/control capability with a "*Virginia*-class" advanced SSN radio room and ISR suite

- 67 percent operational availability by using two crews to achieve a continuous, 2.4-ship deployed presence in support of Combatant Commanders' mission requirements

- 20 times the payload of an SSN, with large ocean interfaces (22 seven-foot diameter launching tubes, two for SOF lock-out), opportunity for payload experimentation and development

Payload

Stealth, endurance, and agility have long enabled nuclear-powered submarines to take sensors and precision weapons into the fray with little or no logistical support. However, in spite of their unmatched supremacy beneath the world's oceans and their ability to strike with impunity with dozens of cruise missiles, the greatest limitation of today's attack submarines is payload.

Even beyond its baseline mission capabilities, SSGN offers significant opportunities to develop and test new weapon delivery systems, sensors, and operational concepts that could further transform naval warfare. Two examples already envisioned are encapsulated launch of a variety of tactical munitions and deployment of large unmanned undersea vehicles (UUVs) and off-board sensors. Encapsulated launch will send weapons to the surface for dry-launching, using a standardized buoyant capsule and a common interface for loading and communications. This modular approach to payloads will even allow use of "off-the-shelf" weapons, unmanned aerial vehicles, and decoys in support of joint forces. And, by developing large UUVs that make full use of the seven-foot tubes, they can surpass the range, endurance, and payload of small surveillance platforms and take on new missions - even offensive ones.

Strike Capabilities

The SSGN will bring a new dimension to strike warfare. Currently, SSNs with up to two-dozen Tomahawks usually launch missiles in salvos of three or four (16 maximum), while on SSGN a salvo of 32 missiles will represent less than 15 percent of the full load of 154 missiles. Existing submarine torpedo-tube launched (TTL) TLAMs will be converted for vertical launch to provide the required load-outs. Obviously, the number of TLAMs available to deploying SSNs will decrease as a result, but if you consider that a missile on an SSGN is deployed 70 percent of the time, the overall TLAM inventory immediately available to the Combatant Commanders will increase by about 50 to 60 percent. This shift of weapons will also open up some room in SSN torpedo rooms for more torpedoes or alternative payloads, like LMRS and other unmanned vehicles.

Special Operations Forces (SOF)

SEALs have operated from submarines for years. Conversion of the SSBNs USS *James K. Polk* (SSN-645) and USS *Kamehameha* (SSN-642) - since inactivated - gave us the space for embarked SEALs to work out and maintain their conditioning for extended periods and to deploy with their equipment. SSGN will not only restore the force's large, sustainable SOF capability, but will include significant command and control capabilities well beyond those of previous boats. With a dedicated command center and a "*Virginia*-class" communication system, SSGN will be able to control a Special Forces campaign over a period of months from her covert position. Once on scene, SSGN will deploy Special Forces submerged, either from the SEAL delivery vehicles (SDVs) housed in the dry-deck shelters, or in the Advanced SEAL Delivery System (ASDS) underwater vehicle, which transports SEALs inside a dry environment. SSGNs should prove to be the most advanced covert Special Forces platforms ever.

Mission Agility

The SSGN's inherent stealth and endurance - as with all nuclear-powered submarines - will enable it to conduct many traditional SSN surveillance or sea control missions, even though it will be optimized for strike and Special Operations Forces because of its immense payload capacity. The SSGN can conduct a wide range of missions in a single deployment. SSGN is a highly flexible multi-mission platform capable of supporting the following operational objectives:

- Assure access to the contested littorals
- Acquire actionable intelligence
- Dissuade and deter by holding vast target sets at risk
- Strike with precision and surprise in support of the JFC's objectives

The mission agility of our nuclear-powered submarines and their broadly trained crews makes them capable of nearly any submarine mission.

Concept of Operations

Dual-crewed SSGNs will deliver these extraordinary warfighting capabilities with unrivaled efficiency. SSGNs will have a deployment cycle similar to TRIDENT SSBNs, with every other crew turnover at a forward-deployed site to achieve a higher operational availability and in-theater presence. A strong, efficient, and well-established infrastructure is required to make this work, and we already have that in

the TRIDENT program. Since the TRIDENT maintenance and support systems are located in Bangor, Washington, and Kings Bay, Georgia, it follows that the most cost-effective option for homeporting SSGN will be at those bases. With four SSGN conversions, two will be stationed on each coast to balance support to the EUCOM, CENTCOM and PACOM theaters. Locations for the forward-deployed turnovers will depend on where they are operating.

SSGNs will be accountable under current START counting rules, and it is important that SSGN be part of future arms control agreements.

Since 1960, SSBNs have guaranteed our security by deterring the use of weapons of mass destruction against the United States. In keeping with the objectives of a transformed Navy, we now have the opportunity to re-deploy these successful ships to make use of their incredible payload, stealth, and endurance in a new deterrent role. With future enemies certain of both our capability and determination - but *un*certain about when and from where our new SSGNs might attack, we achieve a powerful, new level of deterrence and open a door to new capabilities and operational concepts yet to be imagined for submerged, survivable platforms.

Exhibit C

References

1. http://www.navy.mil/navydata/fact_display.asp?cid=4100&tid=200&ct=4
2. http://www.naval-technology.com/projects/typhoon/
3. http://www.fas.org/nuke/guide/usa/slbm/ssbn-726.htm
4. http://www.fas.org/nuke/guide/usa/slbm/c-4.htm
5. http://www.navweaps.com/Weapons/WMRUS_RSM-52.htm